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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,481	10/16/2003	Hisatoshi Hirota	032017	8059

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EXAMINER	
WEINSTEIN, LEONARD J	

ART UNIT	PAPER NUMBER
3746	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/686,481	HIROTA ET AL.	
	Examiner	Art Unit	
	Leonard J. Weinstein	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 2, 2007 has been entered.

2. The examiner acknowledges the amendments to claims 1, 3, 6-7, 18-19, and 21, and notes that claim 2 has been canceled.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1, 3, 6-9, and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi 5,332,365 in view of Hirota US 6,394,761.

Figure 3 of Taguchi '365 teaches the invention as substantially claimed: **[claim 1]** a control valve for a variable displacement compressor for controlling pressure in a crank chamber formed gastight to thereby change a refrigerant discharge capacity including a plunger of a solenoid 430, said plunger is divided into a first plunger, element 481 below element 481c, a second plunger 460, a pressure-sensing member 483 disposed between the first plunger and the second plunger (col. 2 ll. 12-15), the pressure-sensing member 483 senses suction pressure in a suction chamber as disclosed, wherein a first plunger 481 of the control valve 400 being disposed between a valve section, 422d, f, and g, for controlling pressure within the crank chamber and the pressure-sensing member 483, wherein when the solenoid 430 is deenergized a first plunger 481 is urged open and the second plunger 460 is urged by suction pressure received by a pressure sensing member 483 away from the first plunger 481 (col. 14 ll. 18-40); **[claim 3]** a pressure-sensing member is a diaphragm 483; **[claim 6]** it is well known within the art to use a bellows as pressure sensing member within a control valve, further Taguchi '365 states in column 15, on lines 64-68:

> "Moreover, in the preferred embodiment of the present invention, diaphragm 483 is used as a pressure sensing device for sensing pressure in suction chamber 241, though other pressure sensing devices such as a bellows may be used in the present invention."

[claim 7] Taguchi '365 teaches a valve section 422d, f, and g, of the control valve being disposed between first 493a and second 429 ports communicating respectively with a discharge chamber 251 of the variable displacement compressor and the crank chamber 22; **[claim 8]** a valve section 422d, f, and g, having a valve element disposed such that the valve element, 492 and 491b, can be moved from a side of the first port 493a, to and away from a valve seat 422f formed in a passage between, 422g and 429, the first port and the second port 429

communicating with different chambers of a variable displacement compressor, and a shaft 491 disposed between the valve element and the first plunger, for transmitting motion of the first plunger to the valve element; **[claim 9]** a valve section 422d, f, and g including a valve element, 492 and 491b, disposed such that the valve element can be moved from a side of the second port 429, to and away from a valve seat 422f formed in a passage between, 422g and 429, a first and second port communicating with different chambers of the variable displacement compressor. Further Taguchi teaches element 491b respond to the motion of a first plunger, the lower portion of element 481, and moves axially within an annular chamber 422g. Additionally element 491b is integrally connected with element 491a, which has a diameter nearly equal to the diameter of the annular chamber. When the primary valve element 492 is disposed a distance from a valve seat 422f that is equal or slightly less then the length of element 491b, the bottom of element 491b will be disposed near to or above the upper side the opening to element 429, a port leading to a chamber variable displacement compressor. Thus Taguchi '365 discloses the first valve element, 492 and 491b, capable of being moved from a side of the second port 429, to and away from a valve seat formed in a first passage between the first port and the second port. When the primary valve element 492 is disposed so that it rests on the annular ridge forming the valve seat 422f, the primary valve element receives pressure from a chamber on a portion of its lowermost surface, across an area having a diameter equal to the valve seat, minus an area having a diameter equal to that of the shaft 491b, it is integrally formed to. The pressure-sensing piston 491b receives pressure on the surface of the top portion 491c of its main body, from the same chamber through an opening in the annular chamber 422g that is perpendicular to the motion of the pressure-sensing piston. The pressure-sensing piston 491b receives pressure across an area having a

diameter of the main body 491a minus an area having a diameter equal to that of the shaft 491b. The diameter of the piston's main body 491a, and the diameter of the valve seat 422f are substantially equal to the diameter of the annular chamber 422g that the piston moves axially within. Therefore Taguchi '365 discloses a pressure-sensing piston 491a, of a control valve applied above, integrally formed 491c with the valve element such that the pressure-sensing piston has an outer diameter 491a substantially equal to an inner diameter of a valve hole forming the valve seat 422f. Taguchi '365 further teaches a control valve having a pressure-sensing piston that receives pressure from a chamber, at a pressure-receiving area equal to a pressure-receiving area of a valve element, from a direction opposite to a direction from which the valve element receives pressure from said chamber, and a pressure-sensing piston, which receives suction pressure at an end face 488 thereof toward the solenoid 430, for transmitting motion of the first plunger to the valve element; **[claim 17]** valve section 422d, f, and g, having a valve element, 492 and 491b, disposed such that the valve element can be moved, from a side of the second port 429, to and away from a valve seat 422f formed in a passage between, 422g and 429, and the first second ports communicate with different respective chambers of variable displacement compressor. Element 491b of Taguchi '365 is a shaft integrally connected to element the primary valve element 492 of the first valve section. Element 491b responds to the motion of a first plunger, the lower portion of element 481, and moves axially within an annular chamber 422g. Part of the pressure sensing piston 491b is integrally connected with element 491a, which has a diameter nearly equal to the diameter to the annular chamber it moves within. Shaft 491b has a smaller diameter then that of the valve seat 422f therefore a portion of the pressure-sensing piston has an outer diameter smaller than an inner diameter of a valve hole forming the valve seat. Further Taguchi '365 teaches a

pressure-sensing piston that receives pressure from a chamber, at a pressure-receiving area equal to a pressure-receiving area of the valve element, from a direction opposite to a direction from which the valve element receives pressure from the same chamber when the primary valve element rests on the valve seat. When the primary valve element is disposed so that it is not resting on the annular ridge forming a valve seat, it receives pressure across the surface face of its lower half (at minimum) minus the area of the shaft 491b. This constitutes an area larger than that which the pressuring-sensing member receives pressure from the same chamber as mentioned above. The pressure-sensing piston receives said pressure from an opposite direction then the primary valve element when it is disposed as stated. Further the piston receives pressure from another chamber at an end face 488 thereof toward the solenoid 430, for transmitting motion of the first plunger to the valve element; **[claim 18]** a valve section 422d, f, and g, including a valve element, 492 and 491b, disposed between a first port 493a and a second port 429 communicating respectively with a discharge chamber 251 of the variable displacement compressor and the crank chamber 22 and between a third port 428 and a fourth port 427 respectively communicating with the crank chamber and the suction chamber such that the valve element can be moved, from a side of the first port, to and away from a valve seat 422f formed in a first passage, 422g and 429, between the first port and the second port, and a shaft 491 disposed between the valve element and the first plunger 481 below 488 for transmitting motion of the first plunger to the valve element, the first plunger opening and closing the second passage between the third port and the fourth port 481b; **[claim 19]** a first valve element, 492 and 491b, disposed between a first port 493a and a second port 429 communicating respectively with a discharge chamber 251 of the variable displacement compressor and the crank chamber 22 and between a third port 428 and a fourth port 427.

Element 491b is a shaft connected to the primary valve element 492. Element 491b responds to the motion of a first plunger, the lower portion of element 481, and moves axially within a chamber element 422g. Additionally element 491b is connected with element 491a, which has a diameter nearly equal to the diameter to annular chamber 422b. When the primary valve element 492 is disposed a distance from a valve seat 422f equal or slightly less then length of element 491b, the bottom of element 491b will be disposed to near to or above the upper side of 422g, the port leading to the crank chamber. The large diameter of element 491a would close the passage between the first and second ports. Taguchi '365 teaches a the first valve element, 492 and 491b, capable of being moved from a side of the second port 429, to and away from a valve seat formed in a first passage between the first port and the second port, a pressure-sensing piston 491a integrally formed 491c with the first valve element such that the pressure-sensing piston has an outer diameter substantially equal to an inner diameter of a valve hole forming the valve seat 422f, and receives pressure from a chamber, at a pressure-receiving area 491c equal to a pressure-receiving 422f area of the valve element from a direction opposite to a direction from which a valve element receives pressure from the same chamber, and a second valve element 480 integrally formed via 481b, 481c, and 488 with the pressure-sensing piston such that the second valve element opens and closes a second passage 422b between the third port and the fourth port and receives the suction pressure at an end face 488 thereof toward the solenoid 430, for transmitting motion of the first plunger to the valve element. Taguchi further teaches **[claim 20]** a solenoid of the control valve including a spring 470 for urging the second plunger toward the first plunger against the suction pressure received by the pressure-receiving member, and an adjustment screw 414c for adjusting the load of the spring 470; **[claim 21]** and first plunger, element 481 below element 481c, in a

state such that the valve section is urged open when the solenoid 430 is de-energized, and the position of the first plunger, element 481 below element 481c, is controlled by the second plunger 460 and by the pressure-receiving member 483 when the solenoid 430 is energized (col. 13 ll. 56-65).

Taguchi '365 fails to teach the following limitation for a control valve for a variable displacement compressor that is taught by Hirota including: **[claim 1]** a control valve wherein when a solenoid 21 is energized, a first plunger 23, and a second plunger 25, attract each other with magnetic force via a pressure-sensing member 9 to become an integral member attracted by a 22 (Hirota – col. 3 ll. 10-15). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify a control valve so that a diaphragm acts in unison as one member with a first and second plunger when a solenoid is energized in order to reduce a pressure effective area of a diaphragm so a to reduce the size of a control valve and to provide a means for operated a control valve without a delayed during a stroke of the integral member.

6. Claims 1, 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi 5,165,863 in view of Hirota US 6,394,761. Taguchi '863 teaches the invention as claimed for control valve for variable displacement compressor including: **[claim 1]** a plunger of a solenoid 430 is divided into a first plunger 480 and a second plunger 460, and a pressure-sensing member 418 is disposed between the first plunger and the second plunger, for sensing suction pressure in a suction chamber, as stated in column 8 on lines 60-63, as element 480 is divided into two portions, the first being a truncated cone 484, the second being a lower annular portion that is disposed around element 481 and further in abutment adjacently below said truncated cone, the lower annular portion of element 480 is considered to be a first plunger,

wherein the first plunger is disposed between a valve section for controlling pressure within the crank chamber and the pressure-sensing member, a first plunger is in a state when solenoid the deenergized such that the valve section is urged open and the second plunger is urged the suction pressure received by the pressure-receiving member in a direction away from the first plunger; **[claim 10]** a shock-absorbing means 482 disposed between the pressure-sensing member 418 and the first plunger 480; **[claim 11]** a shock-absorbing means having a disk disposed 482 between a pressure-sensing member 418 and the first plunger 480, and a spring 491 constantly urging the disk to be in abutment with the pressure sensing member (col. 9 ll. 26-31); **[claim 12]** a sleeve 486 centers the first plunger 480 and disk of the control valve 482, by the inner walls of both the truncated cone and first plunger portion of element 480; **[claim 13]** a first plunger 480 is centered by being fixed to a pressure-sensing member 483 that is integrally formed with a valve element 487 of a valve section, boundary between diameter sections 421 and 422. The valve section controls pressure in the crank chamber, and is axially movable as stated in column 7 on lines 59-60. A disk centered through fitting of a convex or concave portion 482 formed in a center of the end face thereof opposed to the pressure-sensing member and a concave or convex portion formed in a center of the pressure-sensing member 418 and the second plunger. Taguchi '863 teaches a disc 482 having a truncated endface, considered to be a lowermost portion convex in shape. The outer peripheral areas of said convex portion are received by the inner wall of a radial and vertical protrusion formed throughout a circumference of the pressure-sensing member 418, a diaphragm. The upper most endface of the pressure sensing member, considered within the peak of circumference of the protrusion described above, is in abutment with the convex portion of said disc 482. Therefore Taguchi '863 teaches a disc 482 having a convex portion that is received by a

concave portion of the pressure-sensing member 418. The disc 482 thereby centered within a second cylindrical casing 421 of the control valve.

Taguchi '761 fails to teach the following limitation for a control valve for a variable displacement compressor that is taught by Hirota including: **[claim 1]** a control valve wherein when a solenoid 21 is energized, a first plunger 23, and a second plunger 25, attract each other with magnetic force via a pressure-sensing member 9 to become an integral member attracted by a 22 (Hirota – col. 3 ll. 10-15). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify a control valve so that a diaphragm acts in unison as one member with a first and second plunger when a solenoid is energized in order to reduce a pressure effective area of a diaphragm so a to reduce the size of a control valve and to provide a means for operated a control valve without a delayed during a stroke of the integral member.

7. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi '365 in view of Hirota, as applied to claim 1 above, and further in view of Burkett et al. US Patent No. 6,688,853. A combination of Taguchi '365 and Hirota does teach a control valve having a diaphragm as disclosed in claim 3 of the claimed invention.

Claim 4 discloses a diaphragm formed of a polyimide film, which is not taught by Taguchi '365. Burkett et al. '853 teaches a diaphragm the 24 and states in column 6, on lines 53-65 the following:

> "In certain embodiments, the diaphragm 24 may be made of a rigid material, such as stainless steel, a Kapton polymer, and the like. The diaphragm 24 may be stamped from a sheet of material to form the desired shape. A designer should assess the common operating pressure range of the first chamber 12 and select a diaphragm 24 material and shape accordingly. It is preferred to select a material with a rigidity and shape such that at minimum pressure, the diaphragm 24 is in its original form, and at maximum pressure, the diaphragm 24 deflects to a maximum deflection position. Moreover, a material should be chosen that will resist any caustic effects of the fluid from the first chamber 12 if fluid were to leak into cavity 28."

According to the Materials Handbook p. 883, KAPTON is a polyimide film trademark. Burkett et al. '853 teaches a diaphragm that is constructed of a polyimide film. Burkett et al. '853, as applied to Taguchi '365, would provide for a diaphragm, made of a polyimide film, within a control valve therefore teaching all the limitations of claim 4 as applied to claim 3 of the claimed invention. Materials Handbook 14 p. 881, teaches that polyimide is within the category of materials known as superpolymers, and states that these materials "maintain their mechanical, electrical, and chemical resistance properties at temperatures over 400 °F (213 °C) for extended periods." Materials Handbook p. 882 teaches that polyimide materials have "high strength and modulus of elasticity." The material properties of the polyimide satisfy the desired characteristics of a diaphragm as taught by Burkett et al. '853, and as quoted above, which provides the motivation for combining Burkett et al '853 with Taguchi '365. The desired characteristics of a diaphragm, and the material properties of polyimide films, were well known within the art at the time of invention. Therefore it would have been obvious to one of ordinary skill in the art to combine Burkett et al '853 with Taguchi '365, to provide a diaphragm that would retain its shape after being subjected to predetermined external forces.

With respect to claim 5, Taguchi '365 does not teach a diaphragm of a control valve formed by laminating a plurality of pieces of polyimide film. The method of forming the device is not germane to the issue of patentability of the device itself. Therefore, the limitation of formation by laminating has been given little patentable weight.

A modification to Taguchi '365, so as to provide a diaphragm having multiple layers, would amount to a mere duplication of parts. It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art, *In re Harza.* MPEP 2144.04 - VI. Further, Burkett et al. '853 teaches, as cited above, that the material a

diaphragm is composed of and its thickness can affect its characteristic rigidity. Burkett et al. '853 teaches that it is commonly known to construct a diaphragm, having a characteristic rigidity that would be able to withstand a maximum pressure applied during the operation of a control of a variable displacement compressor. It would have been obvious, to one having ordinary skill in the art, at the time the invention was made to provide a diaphragm having a plurality of layers in order to affect the characteristic rigidity to meet the external forces generated during the operation of a variable displacement compressor.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi 5,332,365 in view of Hirota US 6,394,761.

A combination of Taguchi '365 and Hirorta teaches all the limitations as discussed and further with reference to Taguchi '365 teaches: **[claim 14]** a control valve (co. 7 ll. 59-60) for a variable displacement compressor wherein the first plunger, the lower section of 481 below 481c, has a side thereof toward a valve section that controls pressure in the crank chamber, fixed to a pressure-sensing piston 491a which is integrally formed with a valve element 491c of the valve section, and a first plunger, the lower section of 481 below 481c,axially movably held, a side thereof of said first plunger, as stated above, toward the pressure-sensing member 483 held by a guide provided on the outer circumferential surface, a circular plate 482 to be a guide, analogous to the guide as claimed in claims 14-16, for the first plunger, disposed above the pressure-sensing member 483, and within a cylindrical casing 421, the inner surface of the annular bore 482a being centrally located in and throughout the circular plate 482, and guiding the first plunger. Taguchi '365 does not disclose expressly the guide 482 be "C-shaped" fitting around the first plunger and having a gap in its circumference.

At the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to modify the circular plate of Taguchi '365 by filling the annular bores 482b and creating a gap in circumference of the circular plate to provide a c-shaped fitting around a first plunger because applicant has not disclosed that the c-shaped fitting provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected the claimed invention to perform equally well with the circular plate 482 of Taguchi '365 because the plurality of annular bores 482b spaced radially within the section of a circular plate 482 that is located between its outermost circumferential surface and the inner surface 482a of the central bore allows for the transfer of pressure and/or refrigerant to a space between the circular plate 482 and the surface of the pressure-sensing member 483 that can come into abutment with the bottom surface of the first plunger during operation of the control valve. Therefore, it would have been an obvious matter of design choice to modify the shape of the circular plate of Taguchi '365 into a ring or circular member having a gap between two points in its circumference to obtain the invention as specified in claim 14.

9. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over 5,332,365 in view of Hirota US 6,394,761 as applied to claim 14 above.

A combination of Taguchi '365 and Hirorta teaches all the limitations as discussed and further with reference to Taguchi '365 teaches: **[claim 16]** a control valve wherein the first plunger has a surface thereof for contact with the pressure-sensing member, formed into a tapered shape. Figure 5 of Taguchi '365 shows a first plunger, the section of element 481 below sub-element 481c, having a lowermost circular endface with a rounded outermost edge extending radially throughout its circumference and upward to the main body of the first

plunger. This endface opposes the pressure-sensing member 483. A combination of the Taguchi '365 and Hirota fails to teach a first plunger being held by two "C-shaped" guides provided there around and axially spaced from one another. The additional c-shaped guide allows for the transfer of pressure and/or refrigerant to a space between the circular plate 482 and the surface of the pressure-sensing member 483 that can come into abutment with the bottom surface of the first plunger of Taguchi '365. The amount of pressure or refrigerant transferred is not affected by the addition of a second c-shaped guide. It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art, *In re Harza.* MPEP 2144.04 - VI. Therefore it would have been obvious, to one of ordinary skill in the art, to provide two circular plates as applied, and according to claim 14 of the claimed invention, in order to transfer pressure and/or refrigerant within a control valve, since such a modification would amount to a mere duplication of parts.

Response to Arguments

10. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

11. The examiner notes that the amendment to claim 1, presents limitations which more clearly set for the relationship between elements which applicant discloses as moving in unison when a solenoid is energized. The examiner also notes that the disclosure, specifically on page 12 in lines 12-20, page 13 lines 21-27, and page 14 lines 1-12, contains subject matter that clarifies the relationship more definitely. The subject matter that applicant has disclosed including that a circuit is formed by hollow cylindrical member 20, casing 27, and the elements which move axial in unison when a solenoid is energized, is of particular significance. As claimed, although the limitations as claimed require a first and second plunger attract each

other with magnetic forces, this does not require that a magnetic force be the only force which causes and attraction between the two elements. Therefore as discussed above Hirota teaches the attraction of plungers as claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard J. Weinstein whose telephone number is (571) 272-9961. The examiner can normally be reached on Monday - Thursday 7:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Karmer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LJW

DEVON C. [illegible]
PATENT EXAMINER

1/18/08